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(54) Title:	COMMUNICATIONS SYSTEM AND A METHOD THEREFOR	
(57) Abstract	<p>The present invention relates to a communications system and a method for the same. The invention relates further to a method and an arrangement for paying calls and/or service, and an intelligent network. The method for paying calls in a telecommunications network is used in an intelligent network environment provided with user accounts for individual users. Said user accounts enable prepaid calls and/or an access to various services. The method comprises steps for accessing a loading service through a user interface operationally connected to the intelligent network, accomplishing a loading of a requested amount of balance into a user account of an individual user by means of the user interface and the loading service. The loading stage comprises steps of decreasing the requested amount from a record in the intelligent network indicating an amount of prepaid balance which said user has paid beforehand by buying a voucher or similar, said record being dedicated to said voucher or similar, and loading a corresponding amount of balance into the user account of the individual authorized user requesting the loading operation.</p>	
<pre> graph TD SSP[SSP] --- 160 SSP --- 170 SSP --- 172 SSP --- 174 SSP --- 176 SSP --- 178 SSP --- 190 SSP --- SS7[SS7] SSP --- Computer[computer] Computer --- Triggering[Triggering function] Computer --- Switching[Switching function] Computer --- IP[IP] Computer --- Traffic[Traffic processing and call functions] SCP[SCP] --- 162 SCP --- 180 SCP --- 182 SCP --- 184 SCP --- Computer2[Computer] Computer2 --- Service[Service logic] Computer2 --- Database[Database] Database --- 184 </pre>		

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COMMUNICATIONS SYSTEM AND A METHOD THEREFOR

FIELD OF THE INVENTION

The present invention relates to a method for accomplishing payments of calls and/or services, especially, but not exclusively, by using IN services in telecommunications. The invention relates further to an arrangement for facilitating the payments of calls and/or services through telecommunications equipment.

BACKGROUND OF THE INVENTION

Telephone services and calls may be charged by various alternative manners. Usually the charging or billing is done in accordance with the used calling time. In many instances it is preferred to be able to charge the price of the call beforehand, so that the operator will avoid any credit losses of unpaid bills, especially in cases where the callers are not actual subscribers of the particular operator (i.e. have not made any agreements with the operator).

The conventional way of precharging the calls are the public coin (or note) telephones. These, however, require a lot of maintenance and service. In addition, some of the users may feel it uncomfortable to have coins with them. The amount of coins needed may also be substantially high, e.g. when making an international call or accessing certain service numbers and services. The public money phones are also easy and common targets for robberies.

More recent possibility to charge the calls beforehand is such that the operator sells prepaid calling cards including a desired amount of preloaded money for the calls (for a certain calling time). Usually these cards are provided with a magnetic strip, or in some cases even with some kind of intelligence (so called smart cards), and thus the caller has to use a telephone provided with a suitable magnetic strip reader or a smart card reader. During a call the amount of money decreases continuously from the card, and after all of the money has been spent the call becomes terminated.

Another possibility is to use such prepaid calling cards which are not provided with the

magnetic strip or similar means for machine reading purposes, but which announce e.g. a specific (personal) number string to the user, which he/she then needs to dial in when initiating a call. The user has to call to a special service where he/she has an individual user account into which he/she has preloaded money for the calls. These cards may be e.g. so called PPMA (Pre-Paid Mobile Access) service cards or scratch-surface calling cards either for ordinary telephones or for mobile phones. In view of these prepaid cards a reference is made to applicant's US patent Application Serial No. 08/836,371 (corresponds to WO 96/15633), and especially to figure 5 thereof, which application is incorporated herein by reference. Almost every telephone can be used for these cards, as they do not require any specific reading devices.

In the above prior art disclosure the monitoring can be accomplished for the calls made by a predefined telephone subscription or by means of a special prepaid card. The use of the prepaid cards enables the user to call from any phone whatsoever, and yet the call will be charged against the user's account, which has a certain pre-set balance indicated by the card. The user of the service has an Account Code and a Personal Identification Number PIN. The call signal of the subscriber is triggered to a Service Control Point SCP of an IN (intelligent network) using the account code and A-number or B-number as a trigger key. The authority may be checked on the basis of the A-number, mobile phone number MSISDN or personal identification number PIN of the subscriber. The SCP checks the subscriber database to see the current balance of the subscriber and notifies the subscriber of the status of the account by a voice message or on the display of the subscriber terminal.

If the account is empty, the call procedure is released, and if the balance is positive, the connection to the call destination is initiated. If the called party replies, charging is started on the basis of the charging information and the pulses are received from the exchange in order to update the balance of the account associated with the card. In addition, the call can be monitored in respect of other conditions indicated in the subscriber record. During the call and at the end of the call, the subscriber's account shows the real time balance, and if the account is empty, desired further processing follows.

In addition, it is prior known to have such SIM (Subscriber Identity Module) cards for mobile telephones by means of which the calling time is limited. This is accomplished such that the card enables an access to a database containing information about the allowed maximum calling time for outgoing calls, which information is then transmitted to and processed by means of the mobile network apparatus e.g. in a manner similar to the above disclosed.

Thus, during a call the prior art telephone network apparatus monitors the amount of money left either in a card or in the account associated to a certain prepaid calling card. In case there is no balance left, the call cannot be continued or new calls cannot be initiated. However, it is possible for the operator to reload new money into the account of the database record, and thus one card containing the subscriber information can be used several times by loading new money into the account.

From the point of view of the telephone operators, the above card solutions are substantially safe, as the calls are always charged beforehand. The distribution and sales of the cards can also be arranged substantially easily and efficiently e.g. from various outlets, such as from shops, kiosks, newspaper stands, tobacco shops etc.

SUMMARY OF THE INVENTION

The above prior art arrangements, however, do still have some disadvantages, for instance in view of easiness of the loading or "refill" transactions, as they do not provide means for the subscriber himself to load money to the user account, e.g. by means of calling to a specific service number. After the card related user account has become empty, the account is in most cases deleted, e.g. the time becomes invalidated or expired, and the user has to buy a new card having a new thereto dedicated account. This requires a lot of capacity from the management system of the accounts, as the number of accounts may easily become essentially high, and there are continuously a great number of accounts to be initiated (for the new cards) and deleted (for the used cards). In addition, a need exist for an improved solution for managing the functions of prepaid calls and/or services.

It is an object of the present invention to overcome the disadvantages of the prior art solutions and to provide a new type of solution for loading of money for calls and/or services through a telecommunications network.

Another object of the present invention is to provide a method and an arrangement, by means of which it is possible for a user of a fixed telephone or a mobile station to reload additional money on his/hers existing user account.

Another object of the present invention is to provide a method and an arrangement, by means of which it is possible for a user to reload additional money on his/hers existing user account in real time by means of his telephone terminal so that the ongoing call can continue.

Another object of the present invention is to provide a method and an arrangement, by means of which it is possible for the subscriber to use all possible database records as prepaid services without any need for postbilling operations.

Another object of the present invention is to provide a method and an arrangement, by means of which it is possible to manage all subscriber related data in a database of an intelligent network.

Another object of the present invention is to provide a method and an arrangement by means of which the user is provided with a possibility to use a prepaid voucher or similar for loading more money or units to his/hers PCC (Prepaid Calling Card) account. A still another object of the present invention is to provide a method and an arrangement by means of which the end user is prompted to load more money or units to the PCC account in case the PCC account is empty or about to become empty.

Another object of the invention is to provide vouchers or similar means for a prepayment having a predefined expiry date.

Other objects and advantages of the present invention will be brought out in the following part of the specification taken in conjunction with the accompanying drawings.

The objects are obtained by a method for paying calls in a telecommunications network comprising an intelligent network, wherein said intelligent network is provided with user accounts for individual users of the telecommunications network, said user accounts enabling prepaid calls and/or an access to various services for said users, comprising accessing an intelligent network loading service through a user interface operationally connected to the intelligent network, accomplishing a loading of a requested amount of balance into a user account of an individual user by means of the user interface and the intelligent network loading service, wherein the loading comprises steps of decreasing the requested amount from a record in the intelligent network indicating an amount of prepaid balance which said individual user has paid beforehand by buying a voucher or similar, wherein said record in the intelligent network is dedicated to said voucher or similar, loading a corresponding amount of balance into the user account of the individual authorized user requesting the loading operation.

An inventive arrangement for paying calls and/or services, comprises a

telecommunications network, an intelligent network provided in connection with the telecommunications network, wherein said intelligent network is provided with user accounts for individual users of the telecommunications network enabling prepaid calls for said users, a user interface for accessing the intelligent network service through the telecommunications network, a record in the intelligent network indicating an amount of prepaid balance which an individual user has paid beforehand by buying a voucher or similar, wherein said record in the intelligent network is dedicated to said voucher or similar, loading service means implemented in the intelligent network for accomplishing a loading of a user account of said individual user with units deducted from said record and enabling further communication through the telecommunications network, wherein said loading is requested by a user interface of said individual user.

The invention provides further an intelligent network, which is accessible by means of telecommunication user interfaces connected to at least one telecommunications network. Said intelligent network comprises user accounts for individual users of said at least one telecommunications network, wherein each of said accounts enables prepaid calls for individual users, one account being dedicated to one individual user, a record indicating an amount of prepaid balance which the individual user has paid beforehand by buying a voucher or similar, wherein said record is dedicated to said voucher or similar, loading service means for accomplishing a loading of the user account of said individual user with units deducted from said record and enabling further communication through the telecommunications network, wherein said loading is requested by a user interface of said individual user.

According to an alternative embodiment the invention provides a communications system which comprises a communications network providing communications services, including a computer for storing in a database thereof records assigned to the users of the communications network. Said database records are comprising a subscription number record and a prepaid calling card number record including user accounts containing a prepaid monetary value for real time payments of calls and/or services, and a voucher record, said voucher record being arranged for adding a given amount into said user accounts or into such converting accounts of the user which are indented for other purposes than for the calling. The system comprises further a plurality of communications terminals having an access to the communications network, a desired communications service being accessible through at least one of the terminals, wherein the computer processes the calls on the communications network to detect when a communication terminal accessed to the communications network requests a communications service

which requires a use of the prepaid monetary value associated to the user account, the computer authorizing the requested communications service in case the prepaid monetary value in said user account is sufficient to cover the payment of the requested communications service.

A method in a communications network for accessing communications services comprises the steps of creating database records with account numbers specifying such a user having at least one of the records containing a monetary value, said records being divided into a subscription number record and a prepaid calling card number record for the calling needs, and into a voucher number record, said voucher number record being for adding of a given amount to the user accounts for calling or to converting accounts of non-calling accounts, providing the user with an access number to the account which associates with a prepaid monetary value through at least one intelligent node of the communications network, calling to a network service number for requesting the services implemented by the network service, selecting an access of the user between the desired database records, in response to the request connecting the user either to the calling services of the network or payment services of the network, changing the monetary value of either the calling user accounts or the converting user accounts by an amount desired by the authorized user.

Several advantages are obtained by means of the present invention, since the solution provides a simple, reliable and controllable manner for loading money by using vouchers which are associated to database records, such as to a user account, for calls and other telecommunication services. The loading can also be performed during an ongoing call. The solution enables the user also to receive an immediate confirmation that the transaction has actually taken place. The lifetime of the actual user account becomes longer, which reduces the need for management of continuous and often occurring openings and closings of the prior art short term user accounts. The user is enabled to use continuously the same identification numbers, PIN codes etc. when establishing a call, as the actual user account remains the same. The user is enabled to him/herself add/load more money or similar units to the user account. The limited usage time of a single voucher provides also an advantage, especially to the operators, as the "old" accounts having only minor sums left may be deleted automatically, and thus the management is facilitated further. The possibility of setting validity periods allows the operator to sell "low price" vouchers for such time periods, when the traffic is otherwise lower, such as for the holiday seasons. The vouchers can also be used as means for different kinds of advertising, as the sales and usage period thereof is short.

In the following the present invention and the other objects and advantages thereof will be described in an exemplifying manner with reference to the annexed drawings, in which similar reference characters throughout the various figures refer to similar features.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is an exemplifying schematic presentation of a general structure of a telecommunications system including an intelligent network;

Figure 2 is a schematic presentation of one arrangement according to the present invention;

Figure 3 is a schematic presentation of an arrangement of a table according to one embodiment of the present invention;

Figure 4 discloses a general flow chart of the present invention; and

Figure 5 discloses a flow chart of the loading of pulse accounts.

DETAILED DESCRIPTION OF THE DRAWINGS

Firstly, the general structure of a telecommunications arrangement including an Intelligent network (IN) enabling switching and charging operations of calls will be explained with reference to figure 1 to give a better understanding of the basis of the invention.

Figure 1 is a schematic presentation of the physical architecture of a public switched telephone network (PSTN) providing telecommunication connections between the users or subscribers thereof. The PSTN comprises a plurality of local exchanges 100 and 102 and a plurality of transit exchanges 120. The local exchanges and the transit exchanges are interconnected with each other by trunk lines 110. The trunk lines 110 also provide interconnections between the various local exchanges, and between the various local exchanges. The subscribers 104 are connected to the local exchanges 100, 102 via subscriber lines 106. Although only a limited number of subscriber terminals are shown to be connected to the PSTN, it will be understood that many more subscriber connections could be supported by each of the local exchanges. When a call is placed by a first subscriber to a further subscriber, the call connection established by the PSTN passes through the local exchanges and perhaps through one or several of the transit exchanges.

The local exchanges 100, 102 or transit exchanges 120 can be based for instance on the well known AXE digital switching system, which is offered by the applicant.

The telephone system of figure 1 includes further a mobile network, e.g. a GSM based public land line mobile network (PLMN), connected to the PSTN or a similar facility, such as to an integrated system digital network (ISDN). The necessary links between the systems are well known in the art. In the example of figure 1 the PLMN includes a gateway mobile services switching center (GMSC) 138 which is connected to several mobile services switching centers (MSC) 136, which in turn are connected to plurality of base station controllers (BSC) 130. Each BSC 130 is connected to a plurality of base stations (BS) 132, each of which supervises a predefined geographical area called as a cell. An arbitrary geographical area may be divided into plurality of radio coverage areas, i.e. into said cells (not shown). The arrangement is such that mobile stations 150, 152, 154 are communicating via an air interface with the nearby base station 132, which in turn is connected to the mobile switching center (MSC), which is further connected to the PSTN via a suitable linking apparatus.

The PLMN includes further a central database, so called home location register (HLR) 134, which is connected to the gateway or central mobile telephone switching services center 138, and also to all local mobile telephone switching centers in the PLMN. The mobile stations or units 150, 152, 154 subscribing the PLMN are registered in the HLR 134. Each of the local MSCs 136 includes further a local database called a visitor location register (VLR) 146, in which all such mobile stations are registered which are located within one of the associated cells of the given MSC at a given moment. Those mobile stations belonging to the given PLMN and located at the moment within a cell area controlled by the VLR 146 are registered temporarily in that VLR 146 and permanently in said HLR 134 at the same time. The HLR 134 is always informed about that particular VLR in which the mobile station is registered at that moment of time.

Each mobile subscription has in the HLR 134 information concerning IMSI (International Mobile Subscriber Identity) and MSISDN (Mobile Subscriber international ISDN) as well as said location information (VLR number), basic telecommunications services subscriber information, service restrictions and supplementary services.

It is to be noted that figure 1 shows only one of the MSCs 136, BSCs 130, HLRs 134, VLRs 146 and BSs 132, while multiples of these elements are omitted for reasons of clarity.

The communications network comprises one or more intelligent network nodes 102. The intelligent network nodes (IN nodes) 102 interface with the traditional telecommunications network, such as the PSTN or PLMN. The IN nodes 102 include a service switching processor, which is sometimes referred to in the art as a service switching point (SSP) 160. The SSP 160 is essentially a local exchange 102 provided with an additional software used to identify the intelligent network (IN) calls. The SSP 160 is in turn connected to a service control processor, which is sometimes referred to as a service control point (SCP) 162.

Referring now also to figure 2, which is a more detailed disclosure of the SSP and SCP. The SSP 160 includes a computer 170, an intelligent peripheral 176 that performs a number of advanced functions, such as voice recognition, a triggering function 172, a switching function 174 and a traffic processing and call control functions 178. A communications connection 190, such as a well known SS7 connection (signalling system No. 7, which is standardized by CCITT) connects the SSP to the SCP 162. The SCP 162 includes a computer 180 and a service logic for implementing various advanced services provided by the intelligent network IN. It is also possible to integrate the SSP and the SCP into a single Service Switching and Control Point processor (SSCP). In either implementation the service logic 182 is independent of the network access and transport implementation.

The SSP 160 provides the subscribers with an access via the communications network to a prepayment network service provided by the SCP 162. While the signalling information is generally communicated to the SSP 160, it is to be understood that such a signalling information is communicated to the switching and call control functions 178 of the SSP. The SSP 160 forwards a request for the prepayment services to the SCP 162 to establish an interaction between the prepayment network service and the calling user/telecommunications device, such as the terminals 104, 150, 152, 154 of figure 1. Thus the SSP 160 interfaces various calls in the network 162 by its digital switching function 174, and makes the prepayment network service available from the SCP 162.

The triggering points in the call switching process are detected at the service switching point SSP 160. A basic example of the triggering point is a call attempt to a specific number. As applied in the present invention, such a triggering point might be a detection of a prepayment network service telephone number, e.g. a specific "800" number or a preselected group of subscribers having a predetermined number string in their subscriber number. When such triggering point is detected by the triggering function, the SSP

computer 170 immediately informs the SCP 162 about the triggering event and forwards various associated call connection data, such as the calling terminal telephone number and the destination number. The SCP 162 responds by processing the information in the computer 180 in accordance with the service logic 182 and returns control orders to the SSP computer 170, which translates those orders into appropriate commands for the switching and traffic processing and call control processing so as to control the digital switching.

The SSP 160 detects the triggering conditions, i.e. identifies those network signals which are related to the services, and handles these signals so as to transfer the calls to the service control processor 162, and further receives the responses from the service control processor 162, verifies at the request of the service control processor whether specific conditions will arise, and if so, transmits corresponding messages to the service control processor 162, orders set-up and release of connections in the transport network and interacts with an intelligent peripheral (IP) equipment 176. The intelligent peripheral 176 may be used e.g. to provide different voice synthesis announcements to subscribers and receive / decode digits from dual tone multi-frequency (DTMF) telephones. In addition, the intelligent peripheral 176 may also receive voice inputs (rather than only DTMF tones) and employ suitable voice recognition software to decode subscriber responses. While the intelligent peripheral 176 may be included within the SSP 160, it may also be provided as a separate node accessible by the service switching point SSP 160 through the switching function 174 thereof.

As was explained, the mobile stations 150, 152, 154 of figure 1 communicate with the base station 132 through an air interface, which in turn is operationally connected to the Mobile Switching Center (MSC) via the BSC. However, it is to be understood that the mobile stations could communicate with base stations of different networks which in turn could be run and owned by different, competing network operators. The mobile station can even communicate with a base station of a foreign operator network, as is shown in figure 1 (Finnish and Swedish mobile networks illustrated as an example). In addition, the connections between telecommunications systems of various countries can be provided in a per se known manner. The operators can have their separate systems for reaching IN services in every country (like in Finland and Sweden of the example). Each of the operators may have an intelligent network of their own, as well as fixed and/or mobile networks with base stations, base station controllers and mobile switching centres and other necessary network elements.

The MSC is capable of routing calls with a predefined suffix to an intelligent network node, and the other calls directly to other subscriber addresses in a manner also per se known by the skilled person. It is to be understood that the arrangement may well be such that all calls are automatically routed to the IN, or that some other procedure for routing a part of the calls to the IN, such as so called hotline service when fixed connections are concerned, may be used in this connection.

In the intelligent network, the databases for various accounts for the users (i.e. the user accounts in the following) are generally implemented within the SCP. The SCP can be defined as an electronic control unit which controls the SSP by means of INAP (Intelligent Network Application Part) protocols. The SCP monitors the calls and accomplishes the charging operations from the user related debit accounts. As can be seen from figure 1 the SSP and the SCP may be connected to one of the exchanges of the PSTN, or they could also be implemented within or connected directly to the MSC of a mobile network.

The accounts may be so called pulse accounts. These are known from the prepaid card arrangement already referred to, and thus not explained further than by mentioning that the electronic pulses in the account equal to a certain amount of money in a certain currency, e.g. such that 1 pulse = 10 pennies. The loading operation is accomplished by reducing the amount of pulses in the voucher record and correspondingly the user account is loaded by adding a corresponding amount of pulses therein. According to one embodiment, the arrangement further includes exchange rate scales or other suitable conversion means for converting the same calculation pulses to equal different currencies, this enabling the prepayments of calls in various countries.

The service provider acts like a 'bank' for the subscribers. The service provider sells pulses to the subscribers by the vouchers or similar means for prepayment. Each of the vouchers have a dedicated pulse account, such as a database record, in the intelligent network loading service. The pulses can be transferred on request from the voucher account into the individual user accounts of each subscriber. The loading of the user accounts by means of the prepaid vouchers is illustrated in more detail by the flow chart of figure 4.

A standard IN controlled PCC (Prepaid Calling Card) service script added Money Loader facility can be used in the invention during the ongoing call. A subscriber has opened a pulse account in an IN of one service operator for a certain telephone number. The subscriber buys thus pulses equal to a certain amount of money, e.g. worth 100 FIM,

from the service provider. This can be accomplished in a per se known manner, e.g. by said prepaid vouchers (with a security code which is hidden under an erasable surface on the card).

Figure 3 discloses in more detail an example of possible database records table stored in the service control point database 184 to be used when implementing the payment service according to the present invention. These database records include different kinds of records, as will be explained in the following. It is to be noted, that even only four different records are disclosed, it is possible to have a greater number (or less) records in one database, depending on the general IN arrangement.

The first record 200 of the database is based on the A-number information. The fields thereof contain an A-number field 202, field 204 for a PIN (personal identification number), a monetary value field 208, amount of monetary value left in the corresponding "account" in field 206, the expiry date in field 210, possible blocking instructions in field 212, etc. The A-numbers which are having an access to the service are classified by the first digits thereof, e.g. the number fields 2400 to 2600 are reserved for this. The first numbers are indented to show the IN category in order to direct the calls to the payment service.

The second record 220 is based on the information the user has in a prepaid calling card which he/she has bought in advance. This calling card record 220 contains an information field 222 containing the card number, a field 224 for the corresponding PIN, a field 228 for the amount of monetary value left in the card, a field 226 for the expiry date, a field 230 for amount of used pulses, and a blocking field 232. This record information is updated during a possible conversation (call).

The third database record 240 comprises a voucher record containing voucher number in field 242, a voucher secret code in field 244 and the amount of money stored in that given voucher in field 248. This record may also include some further fields, such as a field 250 for blocking the voucher to be used e.g. in case when a voucher (or several vouchers) is stolen, and the operator wishes thus to block the use of the voucher(s).

The voucher can be used only for adding money to the monetary field 208 of the first record 200 or to the monetary field 228 of the second record 220, or to the monetary field of another voucher record (not shown) or similar.

The record 240 dedicated for the vouchers, and more precisely, to the voucher related information. The voucher record includes the necessary information for each of the vouchers on sale through various outlets, such as kiosks and newspaper stands. As the user, who has bought a voucher, wishes to load some additional units e.g. to his/hers user account in record 200 or 220, a desired amount is transferred from the appropriate voucher field to the user account as a response for such a request. The voucher includes only information about the database, and the actual credit on that voucher is predefined in the database. In practice the user thus validates the voucher related credit in the database on the basis of the information, such as number string code or similar, shown by the voucher or similar means.

The fourth record 260, which can be accessed by the subscriber, includes a paying account number field 262. The A-number field 202 of the first record 200 is replaced by this real account number field 262. The record includes also similar fields to those described above for the voucher record 240.

The payment service implemented by means of the record 260 can be used for paying an amount which is collected from the account field 246 of the voucher record 240 to an account of the subscriber, the account number whereof being specified by field 262. The subscriber who has contacted the database will be asked for the numbers for identification purposes. When the identification is in order, the user may be asked about the amount of money, i.e. the monetary value, he/she wishes to transfer. After the amount is accepted, the information of this is transferred through an INAP connection to a service data point (SDP), from where the IN has a data connection (e.g. tcp/ip) towards a bank database. The transfer of the monetary value to the voucher record is also possible, if the voucher and the subscriber are provided with that facility. A similar PIN code as what is used e.g. in bank cards or credit cards can be added to the bank account field. The amount to be transferred can be limited to certain predefined maximum amounts. Thus transactions between the user accounts in the IN and "real" accounts in banks are enabled.

The IN apparatus enabling the implementation of the above are available e.g. by the applicant. However, it is to be understood that the details of the various implementations may vary in different installations.

The telephone numbers or A-numbers of the first record 200 can be divided between subscribers using mobile communications and those using fixed network communications. Furthermore, the mobile communications subscriber numbers can be divided into groups,

e.g. to establish number group for subscribers who are only temporarily visiting a certain country or a network, and/or who have a limited amount of monetary value in their account and/or who have an account which is valid for only a short term. To give an example, by means of this the subscriber who is willing to use his/hers own telephone when being abroad is enabled to use the phone without paying any attention to the roaming agreements, as the user may use the mobile telephone with a new SIM card of the local operator of that country or operator area. The SIM card has a dedicated subscriber number which can be used as a temporary subscriber number.

Exemplifying procedures for the prepayment of the calls and/or services by means of the present invention is now discussed with reference to the flow charts of figures 4 and 5.

The user enters the prepaid calling services of the IN e.g. by dialling a specific suffix, so that the SSP may route the call to the service. As the call to the prepaid calling services initiates, the caller may become identified by means of A-number identification (step 101, figure 5), and thus the IN knows the correct user account to be debited from the call.

The IN verifies the balance in the A-number user account. In case the balance in the account exceeds a certain threshold value, the caller is allowed to establish a call to a B-number subscriber. In case the balance of the user account is empty, or lower than said threshold value, a message is sent to the caller, e.g. asking him/her to load additional money to the user account, step 102. The message may be only informative and advising that the balance is running out and that the user should load some more units or money, or a request to load some more units or money in condition that calls are otherwise not allowed or that the ongoing call will become terminated.

The operation according to the present invention starts when the A subscriber decides to load additional units, (such as money or pulses), to his/hers user account, i.e. an account which can be used directly for paying e.g. call or services in real time as the call proceeds (step 104 in figures 4 and 5).

In case the caller wishes at step 104 to load more money to the user account from a voucher account, he/she makes a call to the loading service of the IN. At this stage the user presses appropriate key and e.g. ask the present ongoing call to remain on hold for the time of the loading operations, steps 107, 108 and 109. The call is routed to the IN, e.g. by means of the mobile and/or fixed line apparatus as was described above, and subsequently in the IN to the loading service, whereafter the service asks for the voucher

account number. The service may also ask for a secrecy code and/or PIN number (Personal Identification Number), or A-number identification at this step 110. Some additional measures may also be taken to improve the safety of the transactions, such as a recognition of the calling telephone number and/or user interface.

If an invalid or non existing voucher number is fed in by the user, or if e.g. the A-number information does not match, an announcement is given informing that the number or other code is incorrect or that something else in the data is incorrect. The user is prompted to redial the necessary number strings and/or codes. A certain predefined number of attempts may be set such that after a final (e.g. a third) attempt the call to the loading services becomes terminated if the user still dials the number string incorrectly or some of the other information still does not match. An appropriate announcement may be given at this stage. The amount of new calls to the loading service may also be defined such that after e.g. two subsequent unsuccessful calls even the PCC user account will become blocked due to suspicion of fraud.

According to the specific embodiment the service converts the desired amount to the units used by the prepayment service, such as to pulses. An amount which equals the amount in used units, such as pulses, is reduced from the voucher account and correspondingly added to the actual user account, and thus the loading transaction itself is now completed in step 114 of figure 5. The voucher account is blocked immediately after the units have been successfully transferred from the voucher account to the appropriate user account enabling the calls.

If desired, some announcements can be given to the user, such as a confirmation that the transaction has been successful and is now finished, a new balance of the user account and the balance left in the voucher account, and the expiry date of the voucher. Thus the user is provided with a possibility to assure in real time that the user account has actually received the payment. In case of mobile stations or fixed line telephones provided with display means for text messages (such as SMS i.e. Short Message Service messages), the user does not need to acquire any additional means, as it is possible to implement all the necessary apparatus and software within the network(s) and the IN(s). The confirmation announcement can also be given as voice messages which may be generated automatically by a speech generator means.

The call may then continue or new calls may be initiated in a usual manner. In case the call is long, or consumes a lot of units, it is possible to perform a new loading operation during the same call, as is shown by figure 5.

It is to be noted herein, that the sequence of the disclosed steps may vary, as well as that the routines relating to the passwords, PIN-codes etc. may be omitted or then there may be even some additional steps for obtaining an even improved security. In addition, the announcements given may be automatic, or the user may ask for a such only in case he/she feels it necessary. In addition, it is noted that the flow chart of figure 5 concerns the above described pulse accounts, and that if some other types of account means are used, the steps for pulse transferring are unnecessary and/or might be replaced by some other measures.

The vouchers may have a predefined expiry date. This may be informed by writing on the voucher, and the management of this expiry date is implemented within the IN database. By means of this the circulation of the vouchers becomes faster, and such "almost empty" and/or "forgotten" accounts which otherwise would be in a sleeping mode even for long periods of time can be deleted without any additional warnings to the users.

According to one further embodiment the invention can also be utilized by a mobile user visiting foreign countries where he is not able to use his mobile station or a user who is not able to roam into an area of such a mobile network operator who has not made any roaming agreements with the user's own operator. In case the operator does have the prepaid call service, the user can in such instances access the prepayment service by buying a temporary voucher or a temporary SIM card allowing him/her to use the services of that particular traffic area/operator. The money will become loaded from the voucher to a temporary user account, and thus the charging and a temporary use of the services of that operator will become enabled.

Thus, the invention provides a method and an arrangement by which a significant improvement can be achieved in the area of money transactions. The arrangement according to the present invention is easy and economical to realize by per se known components, and provides an enhanced security for the transactions. It should be understood that the above exemplifying description is not meant to restrict the invention to the specific forms presented in this connection but rather the present invention is meant to cover all modifications, similarities and alternatives which are included in the spirit and scope of the present invention, as defined by the appended claims.

Claims

1. A method of paying calls and/or services in a telecommunications network comprising an intelligent network, wherein said intelligent network is provided with user accounts for individual users of the telecommunications network, said user accounts enabling prepaid calls and/or an access to various services for said users, comprising
 - accessing an intelligent network loading service through a user interface operationally connected to the intelligent network,
 - accomplishing a loading of a requested amount of balance into a user account of an individual user by means of the user interface and the intelligent network loading service, wherein the loading comprises steps of
 - decreasing the requested amount from a record in the intelligent network indicating an amount of prepaid balance which said individual user has paid beforehand by buying a voucher or similar, said record in the intelligent network being dedicated to said voucher or similar,
 - loading a corresponding amount of balance into the user account of the individual authorized user requesting the loading operation.
2. A method according to claim 1, characterized in that the loading of said user account includes:
 - giving an individual number string indicated by the prepaid voucher or similar to the intelligent network loading service through said user interface, said loading service comprising a specific database including said record defining the amount of the prepaid balance, and
 - loading a desired amount of balance from the record of the database to the user account, wherein the correct record of the database is indicated by means of the number string.
3. A method according to claim 1 or 2, characterized in that the user accounts are pulse accounts which define the balance by terms of pulses, an amount of pulses corresponding the amount desired to be loaded is subtracted from a data base associated with the voucher or similar, and a corresponding amount of pulses is loaded to the pulse account of the user.
4. A method according to any of the claims 1 to 3, characterized in that the loading request is accomplished by means of a mobile station.

5. A method according to any of the claims 1 to 4, characterized in that the user is prompted to load more units by an announcement through the user interface.

6. A method according to any of the claims 1 to 5, characterized in that it further comprises the steps of:

identifying the incoming call in the intelligent network service by means of the A-number information of the user,

giving a security code of the individual user to the loading service,

giving the amount to be loaded to the user interface and transmitting an indication about said amount to the loading service,

giving announcement from the loading service of the intelligent network to the user interface informing that the transactions have been accomplished and the new balance on the user account.

7. A method according to claim 5 or 6, characterized in that announcements to the user via the user interface are given as a text message or as a voice message.

8. A method according to any of the preceding claims, characterized in that it further includes:

setting a time limitation for the validity of the prepaid balance in the voucher or similar, and

deleting expired vouchers or similar from the dedicated record of the database.

9. An arrangement for paying calls and/or services, comprising

a telecommunications network,

an intelligent network provided in connection with the telecommunications network, wherein said intelligent network is provided with user accounts for individual users of the telecommunications network enabling prepaid calls for said users,

a user interface for accessing the intelligent network service through the telecommunications network,

a record in the intelligent network indicating an amount of prepaid balance which an individual user has paid beforehand by buying a voucher or similar, wherein said record in the intelligent network is dedicated to said voucher or similar,

loading service means implemented in the intelligent network for accomplishing a loading of a user account of said individual user with units deducted from said record and enabling further communication through the telecommunications network, wherein the

arrangement is such that said loading can be requested by the user interface of said individual user.

10. An arrangement according to claim 9, characterized in that the records are implemented into a database of the loading service means, wherein the arrangement is such that a desired amount of balance can be transferred from the database to the user account as a response to a request given by the user to the user interface.

11. An arrangement according to claim 9 or 10, characterized in that the user accounts are pulse accounts.

12. An arrangement according to any of claims 9 to 11, characterized in that the user interface of the individual user is a mobile station.

13. An intelligent network accessible by means of telecommunication user interfaces connected to at least one telecommunications network, comprising
user accounts for individual users of said at least one telecommunications network, wherein each of said accounts enables prepaid calls for individual users, one account being dedicated to one individual user,

a record indicating an amount of prepaid balance which the individual user has paid beforehand by buying a voucher or similar, wherein said record is dedicated to said voucher or similar,

loading service means for accomplishing a loading of the user account of said individual user with units deducted from said record and enabling further communication through the telecommunications network, wherein the arrangement is such that said loading is requested by a user interface of said individual user.

14. A communications system, comprising:

a communications network providing communications services, including a computer for storing in a database thereof records assigned to the users of the communications network, said database records comprising a subscription number record and a prepaid calling card number record including user accounts containing a prepaid monetary value for real time payments of calls and/or services, and a voucher record, said voucher record being arranged for adding a given amount into said user accounts or into such converting accounts of the user which are indented for other purposes than for calling,

a plurality of communications terminals having an access to the communications

network, a desired communications service being accessible through at least one of the terminals,

wherein the computer processes the calls on the communications network to detect when a communication terminal accessed to the communications network requests a communications service which requires a use of the prepaid monetary value associated to the user account, the computer authorizing the requested communications service in case the prepaid monetary value in said user account is sufficient to cover the payment of the requested communications service.

15. A communications system according to claim 14, wherein the database containing the user records is created by the computer, the computer processes calls on the communications network to detect when the communications terminal accessed to the communications network requests an addition of the monetary value to the user account in the database or to an account otherwise specified by the user, and in response therein prompts the caller to enter the amount of money to be transferred to said user account or said other account.

16. A communications system according to claim 15, wherein the terminal through which the database is accessed is a public telephone, a mobile telephone or a data communications device.

17. A communications system according to claim 16, wherein the calling number is the access number to the intelligent network.

18. A communications system according to claim 16, wherein the access number selects the database records of the service the user desires to access.

19. A method in a communications network for accessing communications services comprising the steps of:

creating database records with account numbers specifying such a user having at least one of the records containing a monetary value, said records being divided into a subscription number record and a prepaid calling card number record for the calling needs, and into a voucher number record, said voucher number record being for adding of a given amount to the user accounts for calling or to converting accounts of non-calling accounts,

providing the user with an access number to the account which associates with a prepaid monetary value through at least one intelligent node of the communications

network,

calling to a network service number for requesting the services implemented by the network service,

selecting an access of the user between the desired database records,

in response to the request connecting the user either to the calling services of the network or payment services of the network,

changing the monetary value of either the calling user accounts or the converting user accounts by an amount desired by the authorized user.

20. A method according to claim 19, wherein it further comprises the steps of determining the prepaid account number associated with the request and authenticating the prepaid account number.

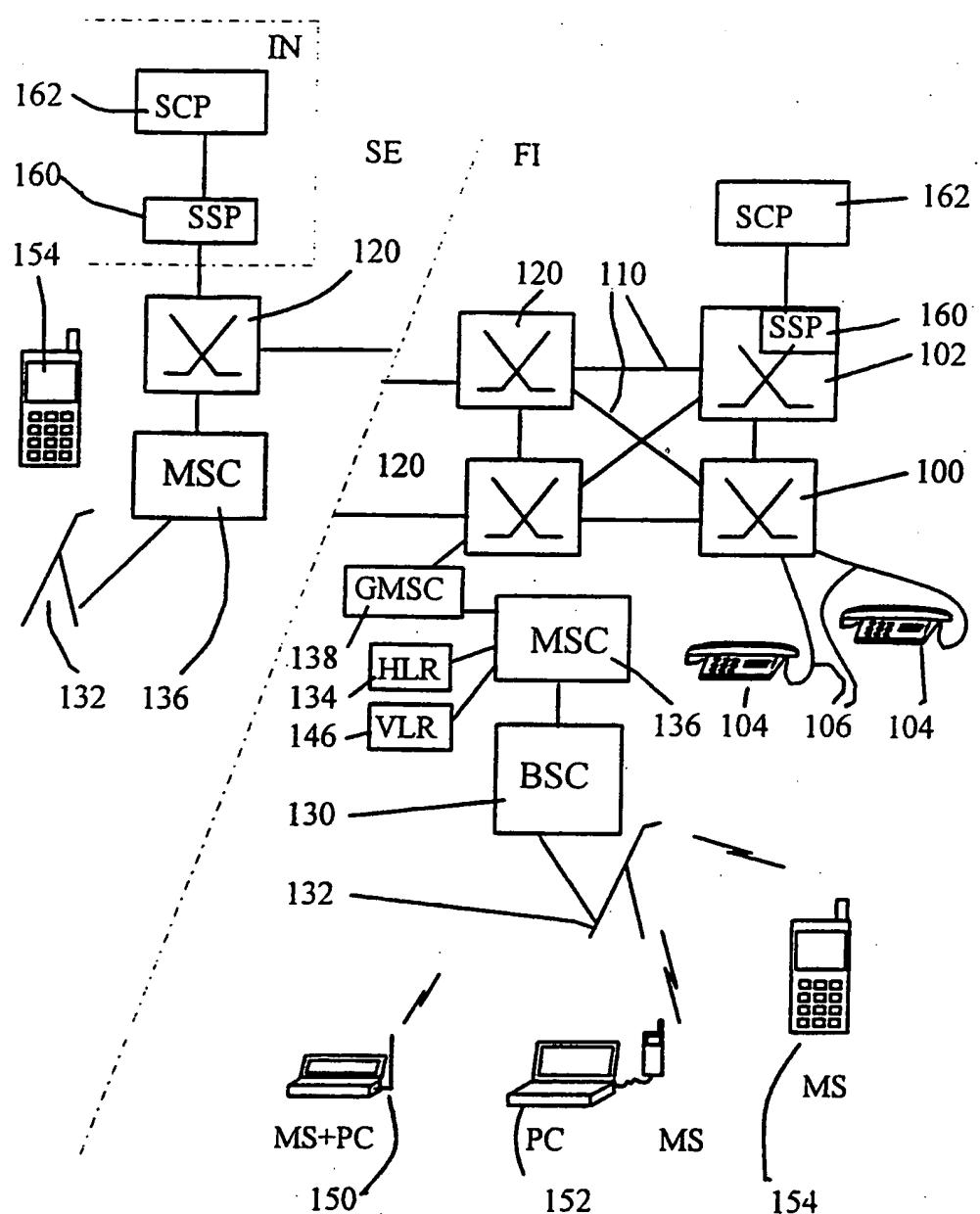


Fig 1

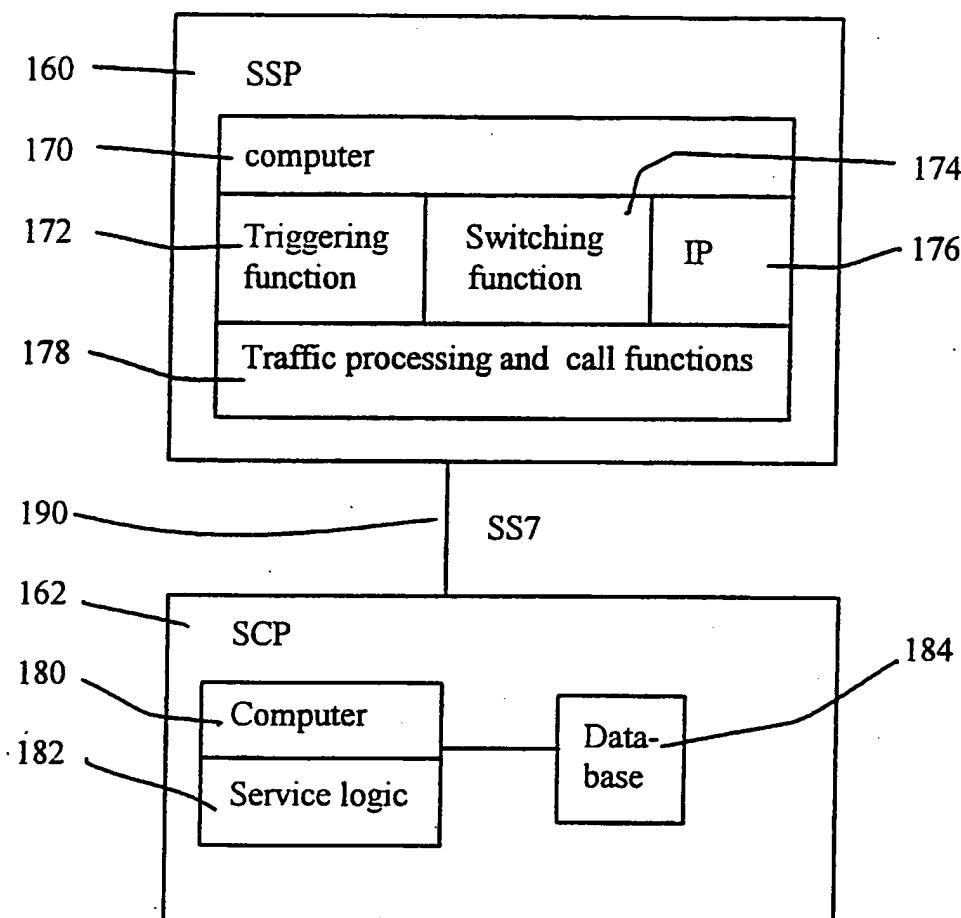


Fig 2

L-number	PIN	Mandatory value	Used monetary value	Expiring date	Blocking	Real account
200	2100557	Abcd	100	50	1998-09-30	INIE
220	2500500	DABC	100	50	1998-07-01	OFF
	1875600	ABCE	50	25	1997-09-30	OFF
222	1197000	ABEC	50	25	1997-09-30	OFF
	7800000	EFGH	100	55	1997-09-29	ON
240	7900000	CDHI	100	60	1997-09-29	
	8000000	ABFG	200	60	1997-12-13	ON
242						1111-6543
260			200	70	1997-12-13	800019-88765

Fig 3

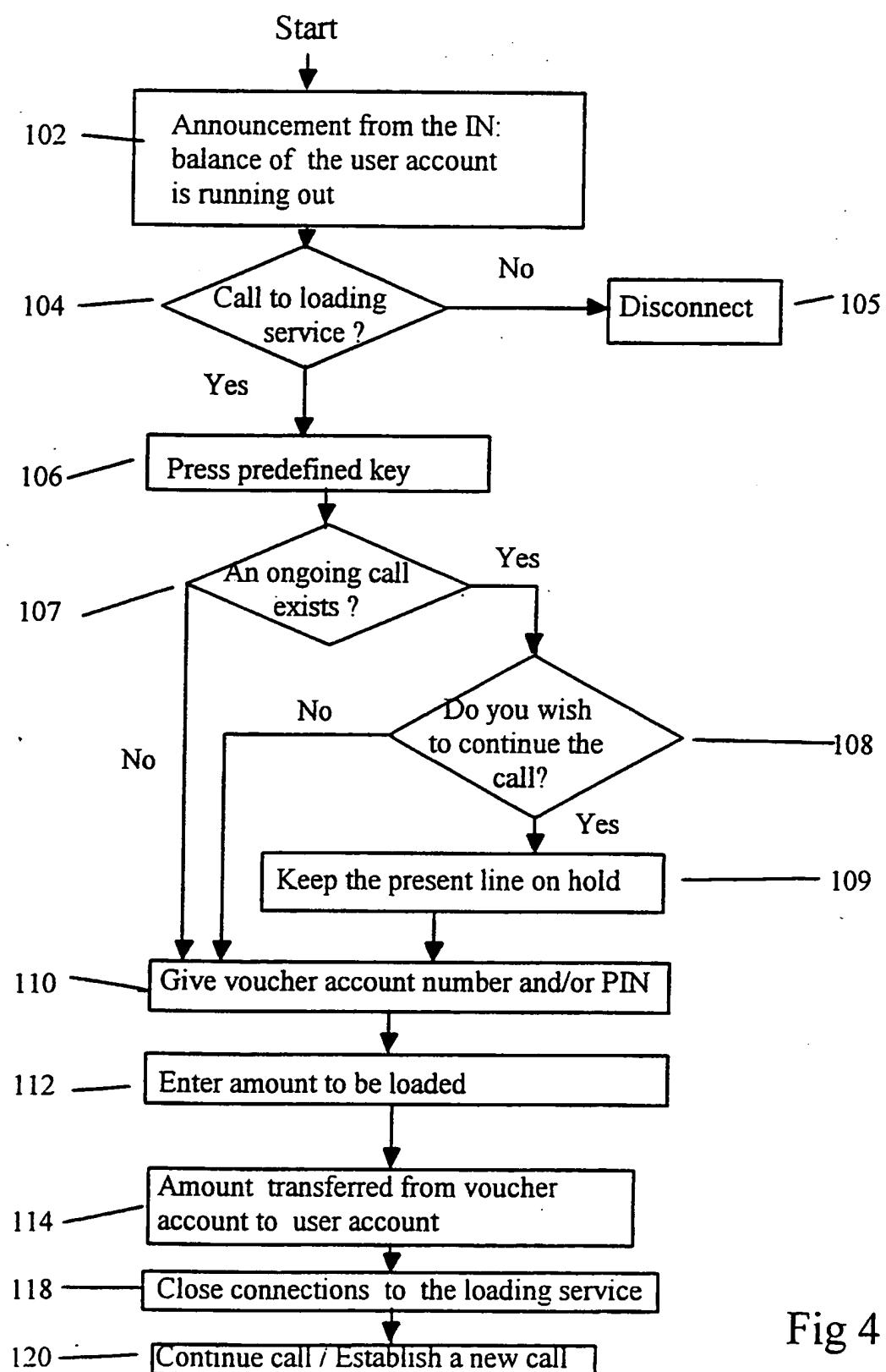
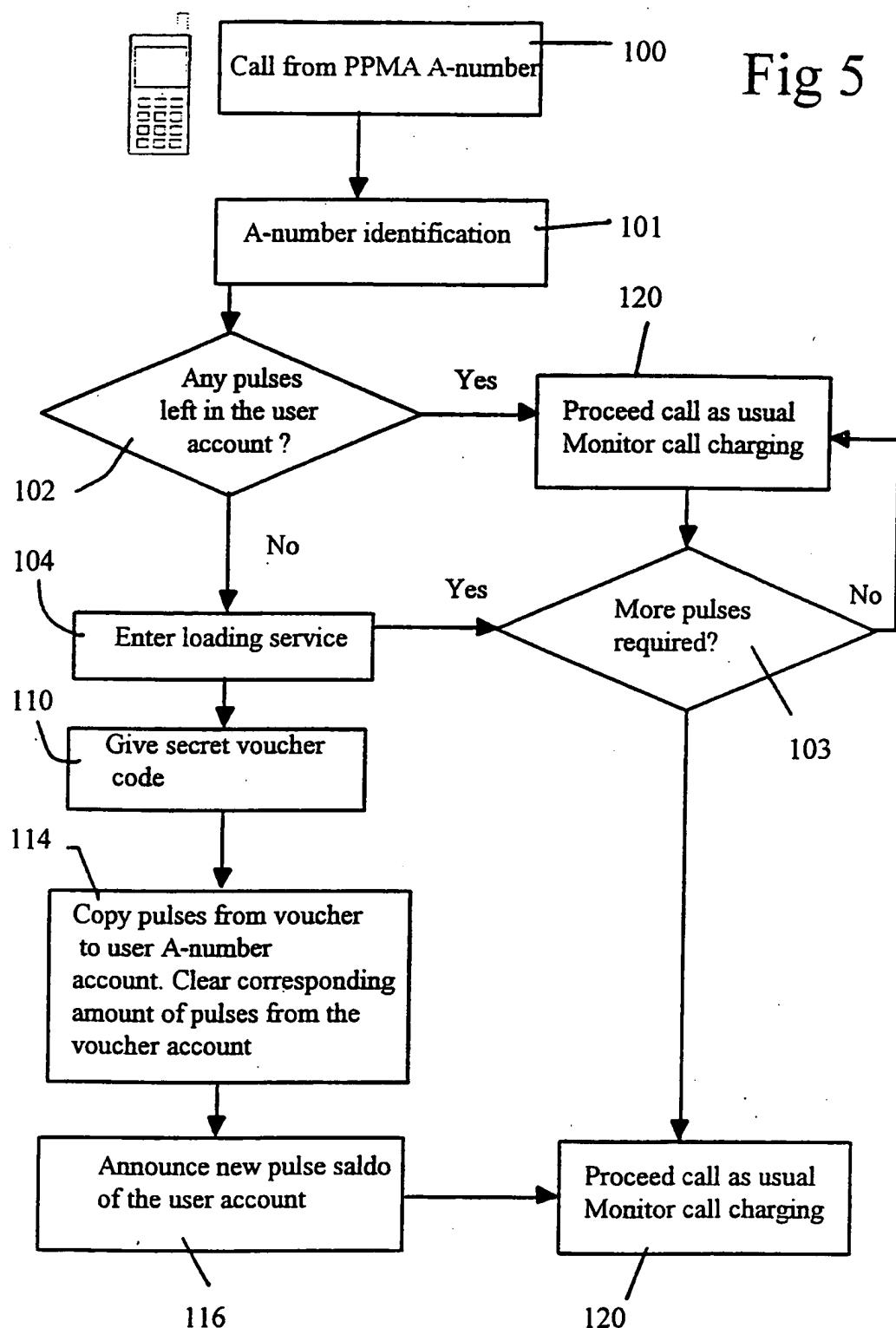


Fig 4



INTERNATIONAL SEARCH REPORT

1

International application No.

PCT/FI 98/00776

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H04M 17/00, H04M 15/00, H04Q 3/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: H04M, H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPIL, EDOC, JAPIO, INTERNET

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	US 5412726 A (ROLA NEVOUX ET AL), 2 May 1995 (02.05.95), see summary of the invention --	1-20
A	WO 9615616 A2 (TELECOM FINLAND OY), 23 May 1996 (23.05.96), figure 5 --	8
A	US 5633919 A (STEVEN HOGAN ET AL), 27 May 1997 (27.05.97), column 93, line 41 - column 94, line 6, figure 117 --	1-20

 Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:

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"A" document defining the general state of the art which is not considered to be of particular relevance

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"Y" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"P" document published prior to the international filing date but later than the priority date claimed

"&" document member of the same patent family

Date of the actual completion of the international search

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17 March 1999

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 98/00776

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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P,X	WO 9818251 A2 (PHILIPS ELECTRONICS N.V.), 30 April 1998 (30.04.98), claim 1	1-20
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Information on patent family members

International application No.

PCT/FI 98/00776

02/03/99

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